

ss, which has the great lakes, Maryland have shown unequivocal evidence of land surfaces at the time of the deposition of the coal. Microscopical examination has proved that these coals are composed of the materials of the same trees whose roots are found in the underclays, and their stems and leaves in the roof shales; that much of the material of the coal has been subjected to subaërial decay at the time of its formation; and that in this, ordinary coal differs from bituminous and earthy bitumen and some kinds of cannel, which have been preserved under water; that the matter remaining as coal consists almost entirely of epidermal tissues, which being suberose in character are highly carbonaceous, very durable and impermeable by water,⁷ and are, hence, the best fitted for the production of pure coal; and finally that the vegetation and the climatal and geographical features of the coal period were eminently fitted to produce in the vast swamps of that period, precisely the effects observed. All these points and many others have been thoroughly worked out for both European and American coal-fields, and seemed to leave no doubt on the subject. But several years ago certain microscopists observed in slices of coal layers filled with spore-cases, a not unusual circumstance, since these were shed in vast abundance by the trees of the coal forests, and because they contain suberose matter of the same character with epidermal tissues generally. Immediately we were informed that all coal consists of spores, and this being at once accepted by the unthinking, the results of the labors of many years are thrown aside in favor of this crude and partial theory. A little later, a German microscopist has thought proper to describe coal as made up of minute algae, and tries to reconcile this view with the appearances, devising at the same time a new and formidable nomenclature of generic and specific names, which would seem largely to represent mere fragments of tissues. Still later, some local facts in a French coal-field have induced an eminent botanist of that country to revive the drift theory of coal, in opposition to that of growth *in situ*. A year or two ago, when my friend Professor Williamson of Manchester, informed me that he was preparing a large series of slices of coal with the view of revising the whole subject, I was inclined to say that after what had been done by Lyell, Goeppert, Logan, Hunt, Newberry and

⁷ *Acadian Geology*, third edition, supplement, p. 68.